Trend Study 16C-12-02

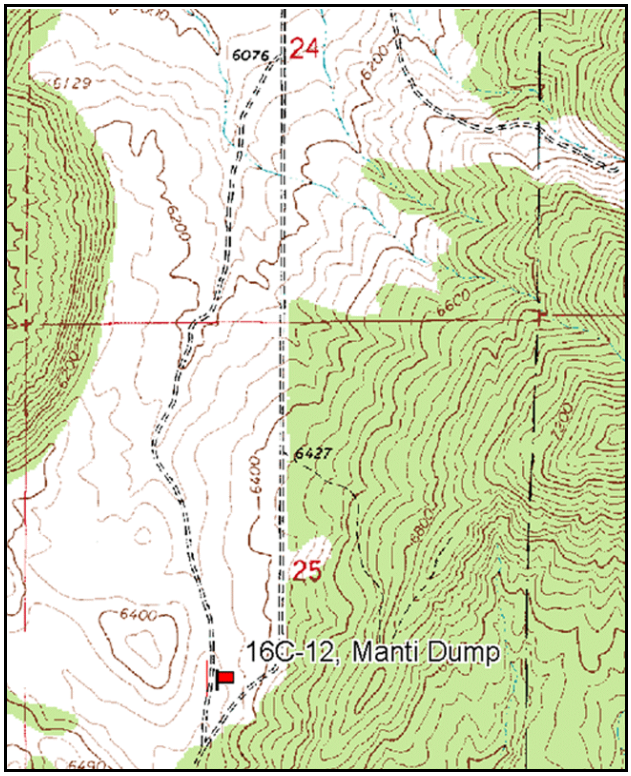
Study site name: Manti Dump . Vegetation type: Chained, Seeded P-J .

Compass bearing: frequency baseline 0 degrees magnetic.

Frequency belt placement: line 1 (11ft), line 2 (34ft), line 3 (59ft), line 4 (71ft), line 5 (95ft). Rebar: belt 5 on 3ft.

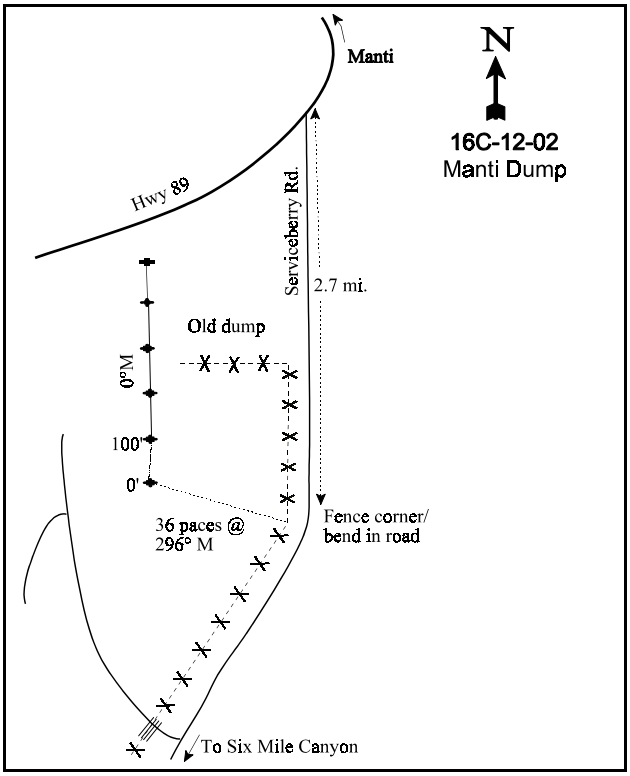
LOCATION DESCRIPTION

On Highway 89 south of Manti, just outside of town, the highway makes a gradual turn to the southwest. At this point (Serviceberry Road), there is a graded gravel road that goes straight south past the old city dump and over to Six Mile Canyon. Take this road for approximately 2.7 miles to where the road turns rather sharply to the southwest. The fence on the west side of the road also makes a slight corner here and begins to head southwest. From where the fence makes a corner, walk 36 paces at 296 degrees magnetic to the 0-foot baseline stake marked by browse tag #179.



Map Name: Sterling

Township 18S , Range 2E , Section 25



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4340837 N 444243 E

DISCUSSION

Manti Dump - Trend Study No. 16C-12

This study is on Division land south of the old Manti dump. It samples a Wyoming big sagebrush range type that was part of the east Manti Dump chain and seeding project completed in 1961. There is little evidence of the chaining except for a few remnant tree trunks on the slopes above the study site. The site has a 10-12% slope with a southwest aspect at an elevation of 6,400 feet. This site usually receives 1-2 feet of snow, yet it still receives moderately heavy use by wintering deer. Elk use is light in most years. Quadrat frequency of deer pellet groups was high in 1997 and 2002. Pellet group transect data collected in 2002 estimated 37 deer days use/acre (93 ddu/ha) on the site. No elk pellets were sampled in the transect, while cattle use was estimated at only 2 days/use acre (5 cdu/ha). Several deer antler sheds have also been observed on the site during past readings. The seeded grasses have been utilized by sheep in the past which graze the area in the spring.

Like several other studies in this unit, the soils are a Fontreen cobbly loam. Precipitation averages 12-14 inches annually. Soils at the site have a clay loam texture which is neutral in reactivity (pH of 7.3). Effective rooting depth is estimated at just over 12 inches with a relatively cool soil temperature of 63°F. One possible limiting factor for this site is that phosphorus (8.1 ppm) is lower than the 10 ppm thought necessary for normal plant growth and development. Soils have a severe erosion hazard on the steeper slopes above the study site as evidenced by active sheet and rill erosion. On the study site, there was evidence of soil movement and plant pedestalling in 1989. Erosion appears to have lessened in 1997 and 2002. Pavement and rock combined to provide over 30% of the surface cover during all readings. Bare soil is low and averaged 8% in 2002. There is a good ratio of herbaceous cover to total vegetative cover, producing good protection for the soils from high intensity summer storms. The erosion condition class assessment for the site was determined as stable in 2002.

The vegetative component has low diversity with two seeded grasses, crested and intermediate wheatgrass, and Wyoming big sagebrush being the dominant species. In 1989, the density of the Wyoming big sagebrush stand was estimated at just over 4,000 plants/acre. Density has since declined to 2,360 plants/acre in 1997 and 1,900 plants/acre in 2002. The decline in density of Wyoming big sagebrush can be partly explained by the high number of dead in both 1997 and 2002. Some of the change in density between 1989 and 1997 is also due to a greatly increased sample size used in 1997 and 2002. This much larger sample gives more accurate estimates for shrub populations that have clumped and/or discontinuous distributions. Use on big sagebrush has been moderate to heavy in all sampling years, as has the decadency rate. Percent decadence was moderate in 1989 and 1997 at just under 40%, but increased to 68% in 2002. Vigor was normal in 1989, but many plants displayed poor vigor in 1997 (23%) and 2002 (35%). Recruitment and biotic potential (# of seedlings) have been low in all years, especially in 1997 and 2002. High decadency and poor vigor coupled with low reproduction are often linked with drought conditions. Drought periods in the late 1980's as well as from 2000-2002 have undoubtedly played a role in the overall condition of Wyoming big sagebrush on this site. Moderate to heavy browsing for an extended period of time may have played a role as well. The Wyoming big sagebrush population may decline in the future as half of the decadent age class was classified as dying in 2002. Annual leader growth on Wyoming big sagebrush averaged only 1 inch in 2002.

The presence of black sagebrush indicates areas of more shallow soil. Initially, black sagebrush had an estimated density of 1,132 plants/acre in 1989. In 2002, density was estimated at 800 plants/acre. As with Wyoming big sagebrush, the decline in density is due to the improved sampling design which more accurately estimates shrub populations. Black sagebrush shows light to moderate use, generally good vigor, and low to moderate decadency in all years. The combined density of pinyon-juniper trees post-treatment was estimated at 51 trees/acre in 2002. Most of the trees occur in the 10-12 foot height class.

As mentioned above, the understory displays low diversity and is dominated by crested and intermediate wheatgrass. These two species provided 82% and 98% of the total grass cover in 1997 and 2002 respectively. Both species have remained at stable frequency values since 1989, and are found mostly in the protection of the sagebrush crowns. Sandberg bluegrass, bottlebrush squirreltail, and Indian ricegrass have also been sampled on the site in at least one of the three sampling years, although all of them occur in very low frequencies. Cheatgrass is also present on the site but has not reached high enough frequencies to be a problem as of yet. It was only sampled in two quadrats in 2002. Perennial forbs are almost nonexistent. The noxious annual, bur buttercup, made up nearly all of the forb cover in 1997 and 2002.

1989 APPARENT TREND ASSESSMENT

The key species, Wyoming big sagebrush, appears to have a stable population. They appear to be sustaining the rather heavy use. The understory is depleted, although potential is naturally low on this site. The vegetative trend appears to be stable to slightly downward overall. The soil trend appears down with evidence of pedestalling and soil movement.

1997 TREND ASSESSMENT

The trend for soil is slightly improved. Soil movement is less apparent with bare soil declining slightly. Most importantly, the herbaceous species make up over 50% of the vegetative cover. Herbaceous cover is critical for protecting soils from high intensity summer storm events. Trend for the preferred browse (Wyoming big sagebrush) is down. Density declined, use continues to be heavy while vigor declined. Decadency remains stable (36%), but the proportion of decadent plants classified as dying is high at 58%. Reproduction is low and not adequate to replace the portion of the population that will likely die in the future. The trend for the herbaceous understory is slightly improved, with sum of nested frequency for perennial grass species showing notable improvement. Most all of the grass cover is contributed by two seeded species which make up 93% of the total herbaceous cover. There are almost no forbs on the site with them only making up 9% of the herbaceous cover. Bur buttercup (a noxious weed) makes up 99% of what little forb cover there is.

TREND ASSESSMENT
soil - slightly up (4)
browse - down (1)
herbaceous understory - slightly up (4)

2002 TREND ASSESSMENT

Trend for soil is stable. Bare soil remains low with minimal erosion. Herbaceous cover and the associated litter are adequate to protect the soil. Trend for browse is down. Density of Wyoming big sagebrush declined while decadency (68%) and poor vigor (35%) both increased to higher than acceptable levels. The proportion of decadent plants classified as dying remains high at 51%, making it likely that Wyoming big sagebrush will continue to decline in the future as no young or seedling plants were sampled in 2002. Trend for the herbaceous understory is stable. Sum of nested frequency for perennial grasses slightly declined in 2002, but the two dominant species, crested and intermediate wheatgrass, remained at stable levels.

TREND ASSESSMENT
soil - stable (3)
browse - down (1)
herbaceous understory - stable (3)

HERBACEOUS TRENDS --
Herd unit 16C, Study no: 12

Type	Species	Nested Frequency			Quadrat Frequency			Average Cover %	
		'89	'97	'02	'89	'97	'02	'97	'02
G	Agropyron cristatum	174	225	193	64	73	67	8.59	8.35
G	Agropyron intermedium	168	183	158	59	64	56	5.50	5.27
G	Bromus tectorum (a)	-	$_{b}$67	$_{a}$4	-	24	2	.43	.01
G	Oryzopsis hymenoides	-	2	-	-	1	-	.03	-
G	Poa bulbosa	-	-	4	-	-	3	-	.04
G	Poa secunda	$_{a}$3	$_{b}$27	$_{c}$38	1	11	19	.21	.29
G	Sitanion hystrix	$_{b}$13	$_{b}$24	$_{a}$-	10	11	-	.31	-
Total for Annual Grasses		0	67	4	0	24	2	0.43	0.00
Total for Perennial Grasses		358	461	393	134	160	145	14.64	13.97
Total for Grasses		358	528	397	134	184	147	15.08	13.98
F	Alyssum alyssoides (a)	-	3	-	-	1	-	.00	-
F	Penstemon spp.	1	-	-	1	-	-	-	-
F	Phlox longifolia	-	-	2	-	-	1	-	.00
F	Ranunculus testiculatus (a)	-	251	253	-	90	80	1.44	1.57
F	Sphaeralcea coccinea	-	2	-	-	1	-	.00	-
Total for Annual Forbs		0	254	253	0	91	80	1.44	1.57
Total for Perennial Forbs		1	2	2	1	1	1	0.00	0.00
Total for Forbs		1	256	255	1	92	81	1.45	1.58

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --
Herd unit 16C, Study no: 12

Type	Species	Strip Frequency		Average Cover %	
		'97	'02	'97	'02
B	Artemisia nova	16	20	1.55	1.00
B	Artemisia tridentata wyomingensis	66	58	10.78	8.16
B	Atriplex canescens	2	0	-	-
B	Chrysothamnus viscidiflorus stenophyllus	2	0	-	-
B	Gutierrezia sarothrae	23	23	.41	1.19
B	Juniperus osteosperma	3	3	1.97	1.54
B	Pinus edulis	0	0	.38	.63
Total for Browse		112	104	15.10	12.52

CANOPY COVER -- LINE INTERCEPT
Herd unit 16C, Study no: 12

Species	Percent Cover	
	'97	'02
Artemisia nova	-	1.00
Artemisia tridentata wyomingensis	-	6.50
Gutierrezia sarothrae	-	1.67
Juniperus osteosperma	1.4	.83
Pinus edulis	1.4	-

Key Browse Annual Leader Growth
Herd unit 16C , Study no: 12

Species	Average leader growth (in)
	'02
Artemisia tridentata wyomingensis	1.1

Point-Quarter Tree Data
Herd unit 16C , Study no: 12

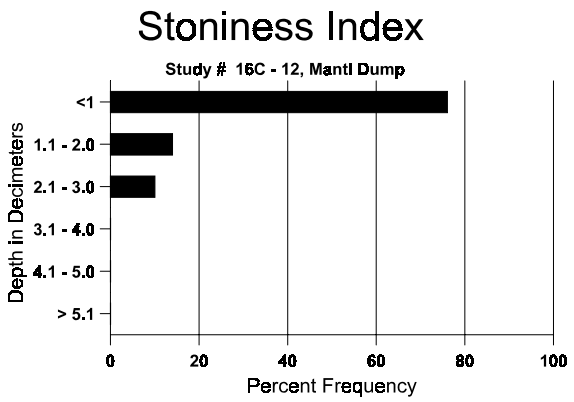
Species	Trees per Acre		Average diameter (in)	
	'97	'02	'97	'02
Juniperus osteosperma	32	40	3.9	2.8
Pinus edulis	7	11	4.4	3.1

BASIC COVER --
Herd unit 16C, Study no: 12

Cover Type	Nested Frequency		Average Cover %		
	'97	'02	'89	'97	'02
Vegetation	363	355	9.00	29.62	28.17
Rock	147	159	1.00	1.15	2.36
Pavement	325	335	29.00	31.22	30.13
Litter	379	371	55.00	31.75	38.28
Cryptogams	198	237	.75	3.03	6.03
Bare Ground	154	239	5.25	4.92	8.87

SOIL ANALYSIS DATA --
Herd Unit 16C, Study no: 12, Manti Dump

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%0M	PPM P	PPM K	dS/m
12.2	63.0 (14.2)	7.3	38.4	35.1	26.6	3.1	8.1	137.6	.6



PELLET GROUP FREQUENCY --
Herd unit 16C, Study no: 12

Type	Quadrat Frequency		Pellet Transect	
			Pellet Groups per Acre	Days Use per Acre (ha)
	'97	'02	'02	'02
Sheep	11	-	-	-
Rabbit	7	25	-	-
Elk	3	-	-	-
Deer	53	44	487	37 (93)
Cattle	-	1	26	2 (5)

BROWSE CHARACTERISTICS --
Herd unit 16C, Study no: 12

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia nova																		
Y	89	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	97	4	-	-	-	-	-	-	-	-	4	-	-	-	80			4
	02	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
M	89	4	8	-	1	-	-	-	-	-	13	-	-	-	866	16	25	13
	97	4	11	-	-	-	-	-	-	-	15	-	-	-	300	17	27	15
	02	21	5	1	-	-	-	-	-	-	27	-	-	-	540	13	24	27
D	89	-	1	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	1	-	-	-	-	-	-	-	-	-	-	-	1	20			1
	02	8	2	-	-	-	-	-	-	-	5	-	-	5	200			10
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	53%	00%	00%	-65%
'97	55%	00%	05%	+50%
'02	18%	03%	13%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	1132	Dec:	6%
	'97	400		5%
	'02	800		25%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Artemisia tridentata wyomingensis																		
S	89	2	-	-	2	-	-	-	-	-	4	-	-	-	266			4
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	3	-	-	-	-	-	-	-	-	3	-	-	-	200			3
	97	2	1	1	-	-	-	-	-	-	4	-	-	-	80			4
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	-	13	22	-	-	-	-	-	-	35	-	-	-	2333	27	29	35
	97	2	19	49	-	1	-	-	-	-	69	-	2	-	1420	42	64	71
	02	9	16	5	-	-	-	-	-	-	30	-	-	-	600	20	33	30
D	89	-	2	21	-	-	-	-	-	-	23	-	-	-	1533			23
	97	1	15	23	2	1	-	-	-	-	17	-	-	25	860			43
	02	12	32	15	2	2	2	-	-	-	32	-	-	33	1300			65
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	800			40
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	980			49

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	25%	70%	00%	-42%
'97	31%	62%	23%	-19%
'02	53%	23%	35%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	4066	Dec:	38%
	'97	2360		36%
	'02	1900		68%

Atriplex canescens																		
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	1	-	-	-	-	-	-	1	-	-	-	20	33	43	1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	49	61	0
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	80			4

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'97	00%	50%	00%	
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	0	Dec:	-
	'97	40		-
	'02	0		-

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Chrysothamnus viscidiflorus stenophyllus																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	3	-	-	-	-	-	-	3	-	-	-	60	8	11	3
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'97	00%	100%	00%	
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	0	Dec:		-
'97	60			-
'02	0			-

Ephedra viridis																		
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0	21	35	0

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'97	00%	00%	00%	
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	0	Dec:		-
'97	0			-
'02	0			-

Gutierrezia sarothrae																		
S	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	3	-	-	-	-	-	-	-	-	3	-	-	-	60			3
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	36	-	-	-	-	-	-	-	-	36	-	-	-	720			36
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	2	-	-	-	-	-	-	-	-	2	-	-	-	133	12	6	2
	97	119	-	-	-	-	-	-	-	-	119	-	-	-	2380	8	7	119
	02	61	-	-	-	-	-	-	-	-	61	-	-	-	1220	4	7	61
D	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	90	-	-	-	-	-	-	-	-	58	-	2	30	1800			90
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	360			18

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	+94%
'97	00%	00%	00%	- 3%
'02	00%	00%	21%	

Total Plants/Acre (excluding Dead & Seedlings)				
'89	199	Dec:		0%
'97	3100			0%
'02	3020			60%

AGE	YR	Form Class (No. of Plants) 1	2	3	4	5	6	7	8	9	Vigor Class 1	2	3	4	Plants Per Acre	Average (inches) Ht.	Cr.	Total
Juniperus osteosperma																		
S	89	1	-	-	-	-	-	-	-	-	1	-	-	-	66			1
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
Y	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	1	-	-	-	-	-	-	-	-	1	-	-	-	20			1
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
M	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0
	97	2	-	-	-	-	-	-	-	-	2	-	-	-	40	-	-	2
	02	2	-	-	-	-	-	-	1	-	3	-	-	-	60	-	-	3
X	89	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	97	-	-	-	-	-	-	-	-	-	-	-	-	-	0			0
	02	-	-	-	-	-	-	-	-	-	-	-	-	-	40			2

% Plants Showing	Moderate Use	Heavy Use	Poor Vigor	%Change
'89	00%	00%	00%	
'97	00%	00%	00%	+ 0%
'02	00%	00%	00%	

Total Plants/Acre (excluding Dead & Seedlings)				
	'89	0	Dec:	-
	'97	60		-
	'02	60		-